

UMZ1NT1

Complementary Dual General Purpose Amplifier Transistor

PNP and NPN Surface Mount

Features

- High Voltage and High Current: $V_{CEO} = 50\text{ V}$, $I_C = 200\text{ mA}$
- High h_{FE} : $h_{FE} = 200 \sim 400$
- Moisture Sensitivity Level: 1
- ESD Rating – Human Body Model: 3A
– Machine Model: C
- Pb-Free Package is Available

MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

| Rating | Symbol | Value | Unit |
|--------------------------------|---------------|-------|------|
| Collector-Base Voltage | $V_{(BR)CBO}$ | 60 | Vdc |
| Collector-Emitter Voltage | $V_{(BR)CEO}$ | 50 | Vdc |
| Emitter-Base Voltage | $V_{(BR)EBO}$ | 7.0 | Vdc |
| Collector Current – Continuous | I_C | 200 | mAdc |

THERMAL CHARACTERISTICS

| Characteristic (One Junction Heated) | Symbol | Max | Unit |
|---|-----------------|--|----------------------------|
| Total Device Dissipation $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 187 (Note 1) 256 (Note 2) 1.5 (Note 1) 2.0 (Note 2) | mW mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 670 (Note 1) 490 (Note 2) | $^\circ\text{C}/\text{W}$ |
| Characteristic (Both Junctions Heated) | Symbol | Max | Unit |
| Total Device Dissipation $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 250 (Note 1) 385 (Note 2) 2.0 (Note 1) 3.0 (Note 2) | mW mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 493 (Note 1) 325 (Note 2) | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Lead | $R_{\theta JL}$ | 188 (Note 1) 208 (Note 2) | $^\circ\text{C}/\text{W}$ |
| Junction and Storage Temperature | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

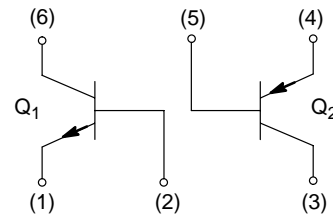
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. FR-4 @ Minimum Pad
2. FR-4 @ 1.0 x 1.0 inch Pad



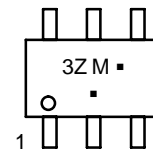
ON Semiconductor®

<http://onsemi.com>



SC-88
CASE 419B

MARKING DIAGRAM



3Z = Device Code
M = Date Code
▪ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

| Device* | Package | Shipping† |
|----------|--------------------|--------------------|
| UMZ1NT1 | SC-88 | 3000 / Tape & Reel |
| UMZ1NT1G | SC-88 (Pb-Free) | 3000 / Tape & Reel |

*The "T1" suffix refers to a 7 inch reel.

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

UMZ1NT1

Q1: NPN

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---------------|------|-----|-------------------|--------------------------------------|
| Collector–Emitter Breakdown Voltage ($I_C = 2.0\text{ mA}$, $I_B = 0$) | $V_{(BR)CEO}$ | 50 | – | – | Vdc |
| Collector–Base Breakdown Voltage ($I_C = 10\text{ }\mu\text{A}$, $I_E = 0$) | $V_{(BR)CBO}$ | 60 | – | – | Vdc |
| Emitter–Base Breakdown Voltage ($I_E = 10\text{ }\mu\text{A}$, $I_C = 0$) | $V_{(BR)EBO}$ | 7.0 | – | – | Vdc |
| Collector–Base Cutoff Current ($V_{CB} = 45\text{ Vdc}$, $I_E = 0$) | I_{CBO} | – | – | 0.1 | μA |
| Collector–Emitter Cutoff Current ($V_{CE} = 10\text{ Vdc}$, $I_B = 0$) ($V_{CE} = 30\text{ Vdc}$, $I_B = 0$) ($V_{CE} = 30\text{ Vdc}$, $I_B = 0$, $T_A = 80^\circ\text{C}$) | I_{CEO} | – | – | 0.1 2.0 1.0 | μA μA mA |
| DC Current Gain (Note 3) ($V_{CE} = 6.0\text{ Vdc}$, $I_C = 2.0\text{ mA}$) | h_{FE} | 200 | – | 400 | – |
| Collector–Emitter Saturation Voltage ($I_C = 100\text{ mA}$, $I_B = 10\text{ mA}$) | $V_{CE(sat)}$ | 0.15 | – | 0.25 | Vdc |
| Transistor Frequency | f_T | – | 114 | – | MHz |

3. Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, D.C. $\leq 2\%$.

Q2: PNP

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|---------------|-------|-----|----------------------|--------------------------------------|
| Collector–Emitter Breakdown Voltage ($I_C = 2.0\text{ mA}$, $I_B = 0$) | $V_{(BR)CEO}$ | –50 | – | – | Vdc |
| Collector–Base Breakdown Voltage ($I_C = 10\text{ }\mu\text{A}$, $I_E = 0$) | $V_{(BR)CBO}$ | –60 | – | – | Vdc |
| Emitter–Base Breakdown Voltage ($I_E = 10\text{ }\mu\text{A}$, $I_C = 0$) | $V_{(BR)EBO}$ | –7.0 | – | – | Vdc |
| Collector–Base Cutoff Current ($V_{CB} = 45\text{ Vdc}$, $I_E = 0$) | I_{CBO} | – | – | –0.1 | μA |
| Collector–Emitter Cutoff Current ($V_{CE} = 10\text{ Vdc}$, $I_B = 0$) ($V_{CE} = 30\text{ Vdc}$, $I_B = 0$) ($V_{CE} = 30\text{ Vdc}$, $I_B = 0$, $T_A = 80^\circ\text{C}$) | I_{CEO} | – | – | –0.1 –2.0 –1.0 | μA μA mA |
| DC Current Gain (Note 3) ($V_{CE} = 6.0\text{ Vdc}$, $I_C = 2.0\text{ mA}$) | h_{FE} | –200 | – | –400 | – |
| Collector–Emitter Saturation Voltage ($I_C = 100\text{ mA}$, $I_B = 10\text{ mA}$) | $V_{CE(sat)}$ | –0.15 | – | –0.3 | Vdc |
| Transistor Frequency | f_T | – | 142 | – | MHz |

UMZ1NT1

Typical Electrical Characteristics: PNP Transistor

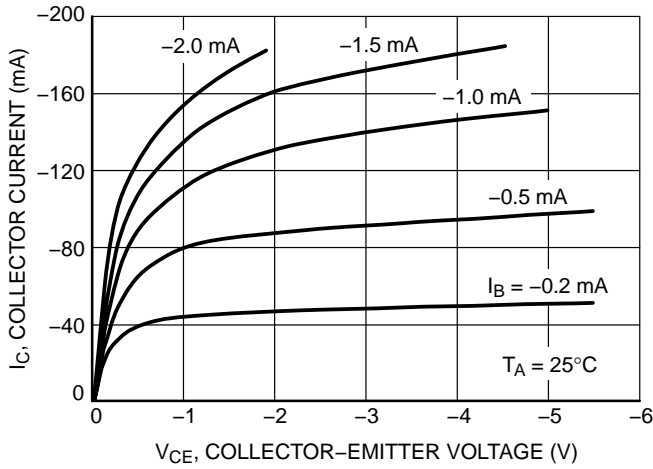


Figure 1. Collector Saturation Region

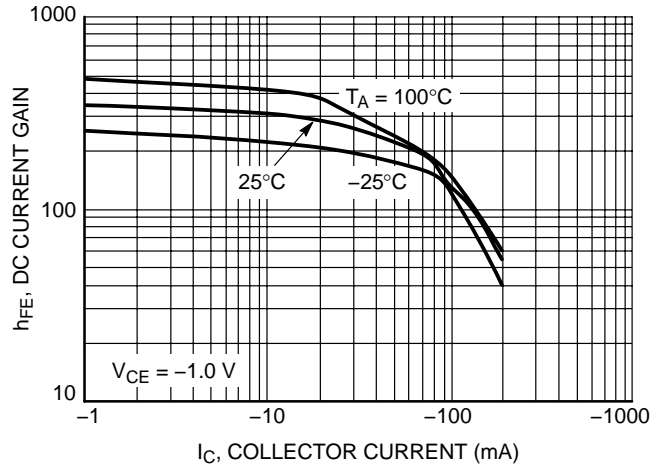


Figure 2. DC Current Gain

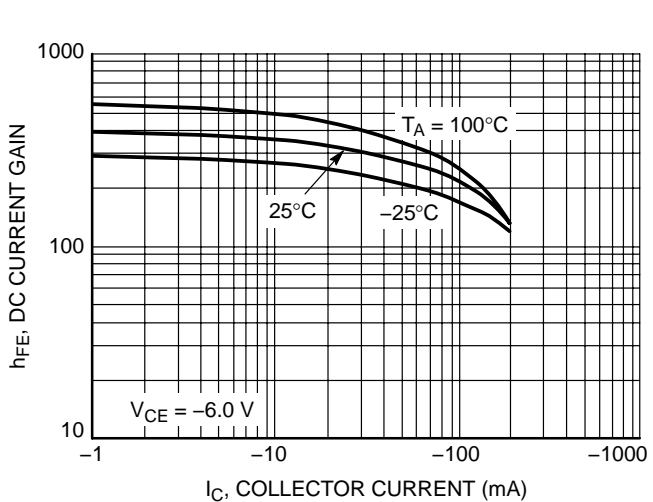


Figure 3. DC Current Gain

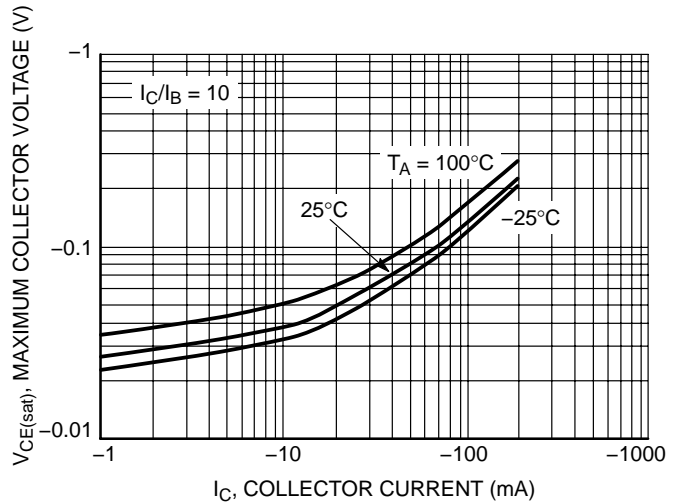


Figure 4. $V_{CE(sat)}$ versus I_C

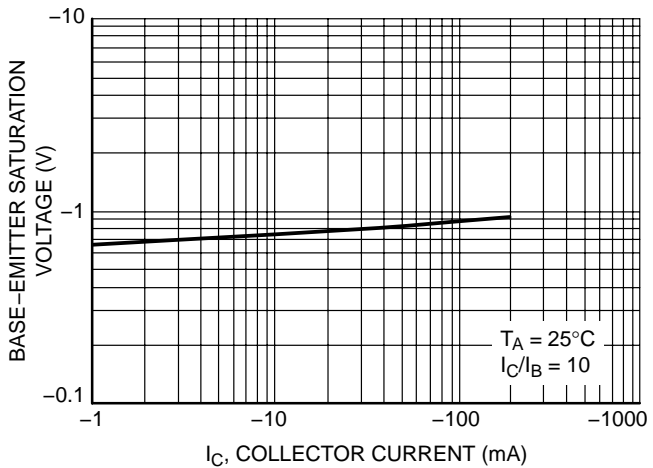


Figure 5. $V_{BE(sat)}$ versus I_C

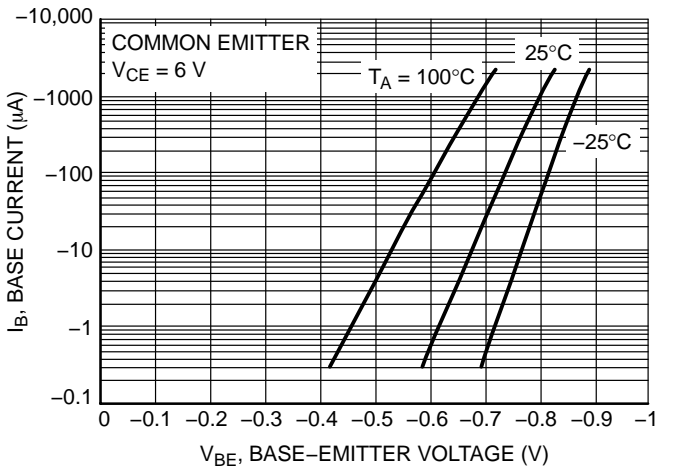


Figure 6. Base-Emitter Voltage

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Typical Electrical Characteristics: NPN Transistor

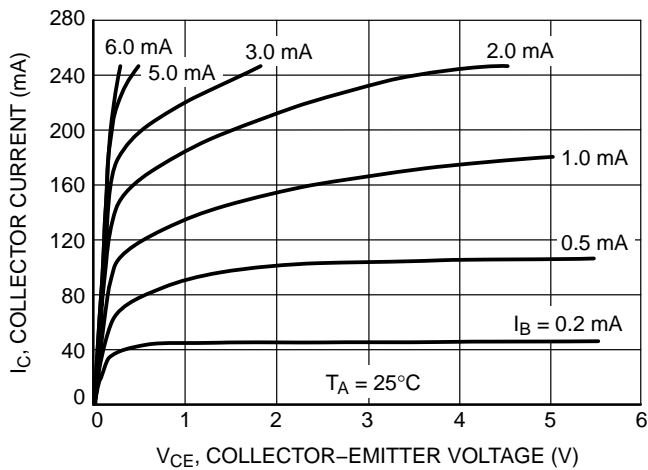


Figure 7. Collector Saturation Voltage

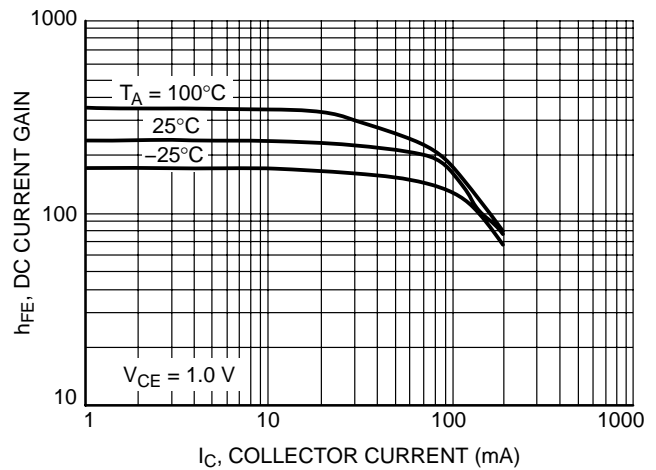


Figure 8. DC Current Gain

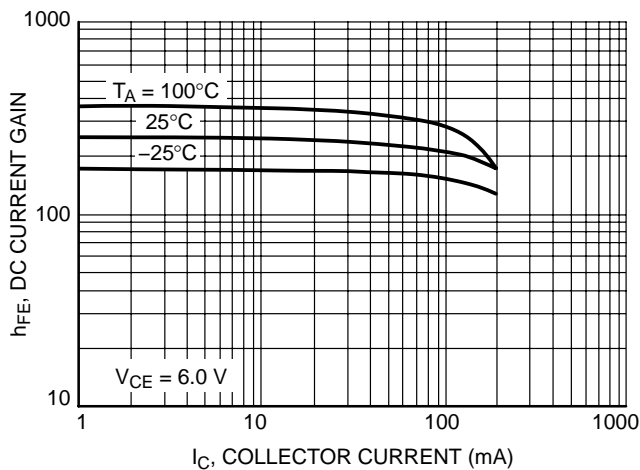


Figure 9. DC Current Gain

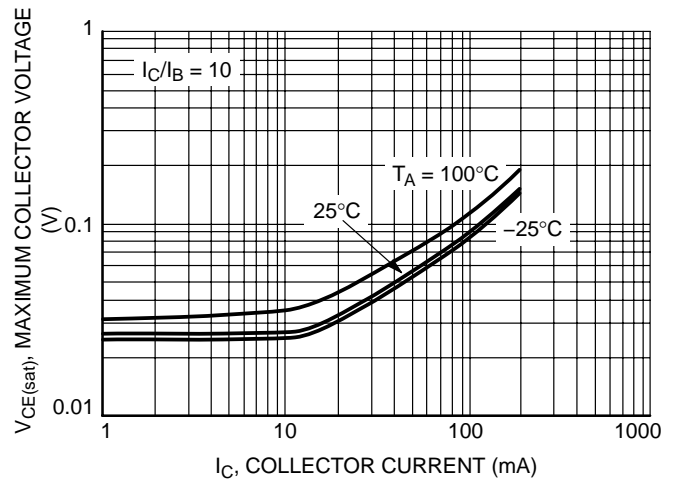


Figure 10. $V_{CE(sat)}$ versus I_C

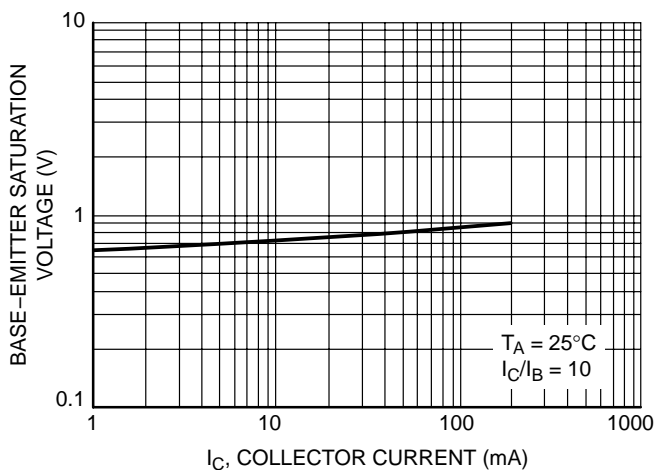


Figure 11. $V_{BE(sat)}$ versus I_C

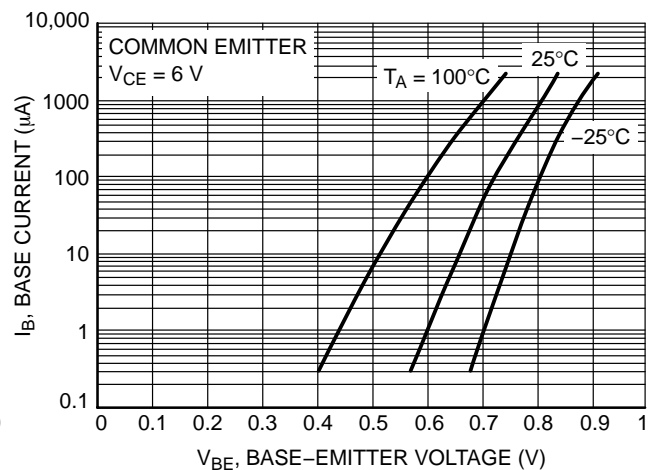
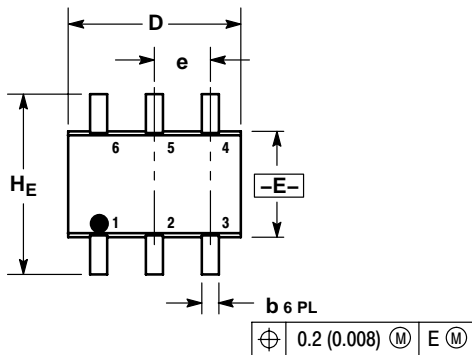


Figure 12. Base-Emitter Voltage

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PACKAGE DIMENSIONS

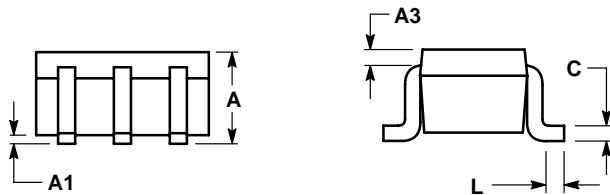
SC-88/SC70-6/SOT-363
CASE 419B-02
ISSUE W



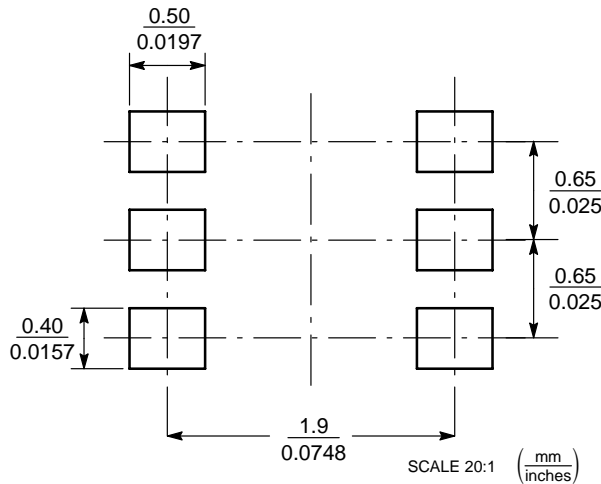
NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

| DIM | MILLIMETERS | | | INCHES | | |
|-----|-------------|------|------|-----------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.80 | 0.95 | 1.10 | 0.031 | 0.037 | 0.043 |
| A1 | 0.00 | 0.05 | 0.10 | 0.000 | 0.002 | 0.004 |
| A3 | 0.20 REF | | | 0.008 REF | | |
| b | 0.10 | 0.21 | 0.30 | 0.004 | 0.008 | 0.012 |
| C | 0.10 | 0.14 | 0.25 | 0.004 | 0.005 | 0.010 |
| D | 1.80 | 2.00 | 2.20 | 0.070 | 0.078 | 0.086 |
| E | 1.15 | 1.25 | 1.35 | 0.045 | 0.049 | 0.053 |
| e | 0.65 BSC | | | 0.026 BSC | | |
| L | 0.10 | 0.20 | 0.30 | 0.004 | 0.008 | 0.012 |
| HE | 2.00 | 2.10 | 2.20 | 0.078 | 0.082 | 0.086 |



SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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